WHAT IS CLAIMED IS:

1. An optical processing device, comprising:

a wave-guide based router operable to separate an input optical signal into a plurality of optical signal wavelengths; and

a linear array of optical switching elements located on a single semiconductor substrate, each of the optical switching elements operable to receive at least a portion of at least one of the plurality of optical signal wavelengths and to perform an optical switching operation on the at least one of the plurality of optical signal wavelengths.

2. The optical processing device of Claim 1, wherein the wave-guide based router is a device selected from the group consisting of a wavelength division demultiplexer, a wavelength grating router, and an arrayed wave-guide grating.

3. The optical processing device of Claim 1, wherein the wave-guide based router is located on the semiconductor substrate.

4. The optical processing device of Claim 1, wherein the optical processing device is selected from the group consisting of an optical router and an optical regenerator.

5. The optical processing device of Claim 1, wherein at least some of the plurality of optical signal wavelengths comprise center wavelengths that are different than center wavelengths of others of the plurality of optical signal wavelengths.

6. The optical processing device of Claim 1, wherein at least one of the optical switching elements comprises:

a fixed layer disposed outwardly from the semiconductor substrate; and

a unitary movable mirror assembly disposed outwardly from the fixed layer and forming with the fixed layer a cavity, the moveable mirror assembly operable to move relative to the fixed layer in response to a voltage applied to the moveable mirror assembly to affect a change in an optical characteristic of the cavity.

7. The optical processing device of Claim 1, wherein each optical switching element comprises a modulator.

8. The optical processing device of Claim 7, wherein each modulator receives one of the plurality of optical signal wavelengths and wherein each of the optical signal wavelength comprises a different center wavelength.

9. The optical processing device of Claim 1, wherein the semiconductor substrate includes a material selected from the group consisting of silicon and indium phosphide.

10. The optical processing device of Claim 1, wherein at least some of the optical switching elements operate to pass its received optical signal wavelength when no voltage is applied to the optical switching element.

11. The optical processing device of Claim 1, further comprising a linear array of wavelength detectors operable to receive at least a portion of at least some of the plurality of optical signal wavelengths, the linear array of wavelength detectors operable to communicate one or more signals associated with at least some of the plurality of optical signal wavelengths to the linear array of optical switching elements.

12. The optical processing device of Claim 1, further comprising a combiner operable to receive the plurality of optical signal wavelengths from at least some of the linear array of optical switching elements and to generate an output optical signal.

13. The optical processing device of Claim 12, wherein the combiner is a device selected from the group consisting of a wavelength division multiplexer, a wavelength grating router, and an arrayed wave-guide grating.

14. The optical processing device of Claim 1, further comprising one or more optical amplifiers capable of at least partially compensating for at least some of the losses associated with processing optical signal wavelengths in the optical processing device.

15. The optical processing device of Claim 14, wherein the one or more optical amplifiers comprise discrete Raman amplifiers.

16. The optical processing device of Claim 1, further comprising a fiber optic tap operable to receive the input optical signal and to separate the input optical signal into a first signal portion and a second signal portion.

17. The optical processing device of Claim 1, further comprising an electronic processor coupled to the linear array of switching elements and operable to perform an electronic processing operation on at least a portion of the input signal and to communicate the signal portion to at least some of the linear array of optical switching elements.

18. The optical processing device of Claim 17, wherein the electronic processor comprises a plurality of controllers, each controller operable to control at least one of the optical switching elements.

19. The optical processing device of Claim 1, further comprising a delay line operable to receive at least a portion of the input optical signal and to delay transmission of the signal portion until another portion of the input signal portion has been processed.

20. An optical processing device, comprising:

a wave-guide based router operable to separate an input optical signal into a plurality of optical signal wavelengths; and

a linear array of wavelength detectors located on a single semiconductor substrate and operable to receive at least a portion of at least some of the plurality of optical signal wavelengths, the linear array of wavelength detectors operable to communicate one or more signals associated with the at least some of the plurality of optical signal wavelengths to an optical switching array.

21. The optical processing device of Claim 20, wherein the wave-guide based router is a device selected from the group consisting of a wavelength division demultiplexer, a wavelength grating router, and an arrayed wave-guide grating.

22. The optical processing device of Claim 20, wherein the wave-guide based router is located on the semiconductor substrate.

23. The optical processing device of Claim 20, wherein at least some of the plurality of optical signal wavelengths comprise center wavelengths that are different than center wavelengths of others of the plurality of optical signal wavelengths.

24. The optical processing device of Claim 20, wherein the optical switching array comprises a linear array of modulators, at least some of the modulators operable to perform an optical switching operation on at least one of the at least some of the plurality of optical signal wavelengths.

25. The optical processing device of Claim 24, wherein each of the at least some of the optical signal wavelengths comprises a different center wavelength.

26. The optical processing device of Claim 24, wherein the linear array of modulators are located on another single semiconductor substrate.

27. The optical processing device of Claim 24, wherein the linear array of modulators are collocated on the semiconductor substrate.

28. The optical processing device of Claim 24, wherein at least one of the modulator comprises:

a fixed layer disposed outwardly from a semiconductor substrate; and

a unitary movable mirror assembly disposed outwardly from the fixed layer and forming with the fixed layer a cavity, the moveable mirror assembly operable to move relative to the fixed layer in response to a voltage applied to the moveable mirror assembly to affect a change in an optical characteristic of the cavity.

29. The optical processing device of Claim 20, wherein the semiconductor substrate includes a material selected from the group consisting of silicon and indium phosphide.

30. The optical processing device of Claim 20, further comprising a combiner operable to receive the plurality of optical signal wavelengths from the linear array of optical switching elements and to generate an output optical signal.

31. The optical processing device of Claim 20, further comprising one or more optical amplifiers capable of at least partially compensating for at least some of the losses associated with processing optical signal wavelengths in the optical processing device.

32. The optical processing device of Claim 20, further comprising a fiber optic tap operable to receive the input optical signal and to separate the input optical signal into a first signal portion and a second signal portion.

33. The optical processing device of Claim 20, further comprising an electronic processor coupled to the linear array of switching elements and operable to perform an electronic processing operation on at least a portion of the input signal and

to communicate the signal portion in to at least some of the linear array of optical switching elements.

34. The optical processing device of Claim 20, further comprising a delay line operable to receive at least a portion of the input optical signal and to delay transmission of the signal portion until another portion of the input signal portion has been processed.

35. An optical processing element operable to receive and switch a plurality of optical signals, the optical processing element comprising:

a fiber optic tap operable to receive an input optical signal and to separate the input optical signal into a first signal portion and a second signal portion, the input optical signal comprising a plurality of optical signal wavelengths;

an electronic processor operable to receive the second signal portion, and to perform electronic processing on the second signal portion; and

an optical switching array operable to receive the first and second signal portions, the optical switching array comprising a linear array of modulators located on a single semiconductor substrate, each modulator operable to perform an optical switching operation on at least one optical signal wavelength associated with the first signal portion.

36. The optical processing element of Claim 35, wherein the semiconductor substrate includes a material selected from the group consisting of silicon and indium phosphide.

37. The optical processing device of Claim 35, wherein at least some of the plurality of optical signal wavelengths comprise center wavelengths that are different than center wavelengths of others of the plurality of optical signal wavelengths.

38. The optical processing element of Claim 35, wherein the electronic processor is operable to communicate one or more signals associated with the second signal portion to the linear array of modulators.

39. The optical processing element of Claim 35, wherein at least some of the modulators are capable of performing an optical switching operation on at least one optical signal wavelength associated with the first and second signal portions.

40. The optical processing device of Claim 35, wherein at least one of the modulator comprises:

a fixed layer disposed outwardly from the semiconductor substrate; and

a unitary movable mirror assembly disposed outwardly from the fixed layer and forming with the fixed layer a cavity, the moveable mirror assembly operable to move relative to the fixed layer in response to a voltage applied to the moveable mirror assembly to affect a change in an optical characteristic of the cavity.

41. The optical processing element of Claim 35, further comprising a waveguide based router operable to separate the first signal portion into a plurality of optical signal wavelengths and to communicate the plurality of optical signal wavelengths to the optical switching array.

42. The optical processing device of Claim 41, wherein at least some of the modulators receive one wavelength of the plurality of optical signal wavelengths and wherein each of the optical signal wavelengths comprises a different center wavelength.

43. The optical processing device of Claim 42, wherein each of the at least some of the modulators operates to pass its received optical signal wavelength received when no voltage is applied to the modulator.

44. The optical processing element of Claim 41, further comprising a combiner operable to receive the plurality of optical signal wavelengths from the optical switching array and to generate an output optical signal

45. The optical processing element of Claim 35, further comprising a waveguide based router operable to separate the second signal portion into a plurality of optical signal wavelengths.

46. The optical processing element of Claim 35, further comprising a delay line operable to receive the first signal portion and to delay transmission of the first signal portion until the second signal portion has been processed.